Computer Engineering Department
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LAB04: Geometric Transformation (Part2)

Objective

Upon completion of this lab, you will be able to write a user-defined function in MATLAB to transform the coordinate of an original pixel, including translation, scaling, rotation, and shearing.

Exercises

Notation that you should create your own user-defined function in MATLAB. It means that you cannot call MATLAB built-in function, which generates output in the same manner as your own program. You can use the images provided in the folder **\Google Drive\EGCI486-Image Processing\Second(2015-2016)\LABs\LAB04_Part2** for your exercises.

1) Translation operations

1.1 Write a user-defined function in MATLAB to translate the coordinate of original pixel to a new place by adding two offsets to all the coordinates in image. Take the following program name: Mytranslate.m. Using this program on the image "lena_color_256.tif" should give you result as shown in Figure 1.

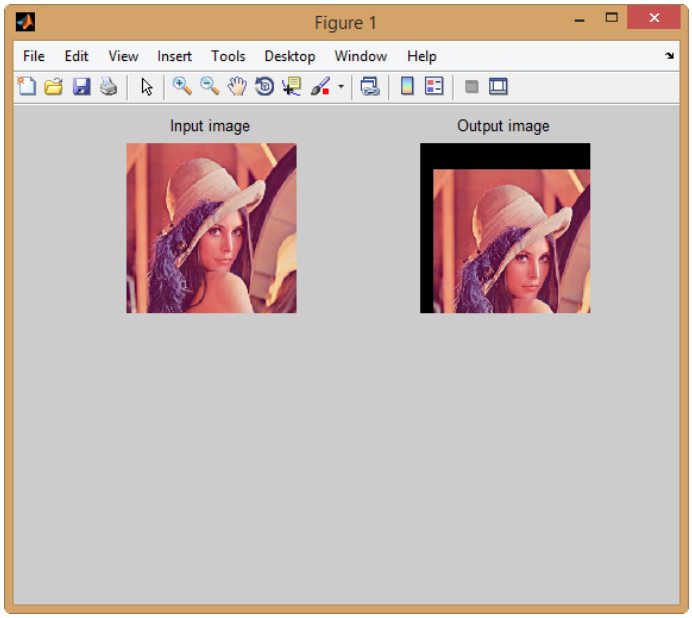

Figure 1: The result of translating the coordinates of original pixel by adding two offsets (with T_x of 20 and T_y of 40).

2) Sclaing operations

2.1 In order to scale image, write a user-defined function in MATLAB for shrinking and stretching the coordinates of original pixel. Take the following program name: Myscale.m. When this program is used with the image "lena_color_256.tif" result as shown in Figure 2.

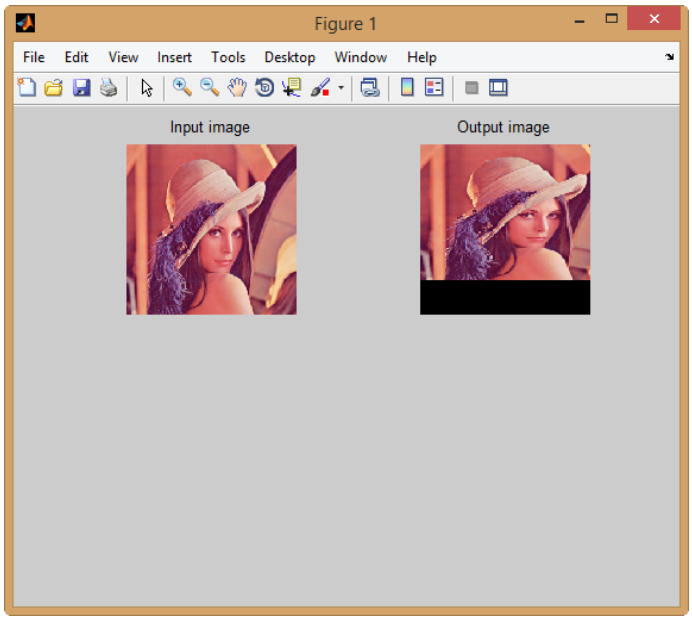

Figure 2: The result of scaling the coordinates of original pixel by the x-coordinate is stretch (S_x) 1.2 times and the y-coordinate is shrink (S_y) 0.8 times.

3) Rotation operations

3.1 In order to rotate image, write a user-defined function in MATLAB for rotating the coordinate of original pixel to a new place by some angle. Take the following program name: Myrotate.m. Using this program on the image "lena_color_256.tif" should give you result as shown in Figure 3.

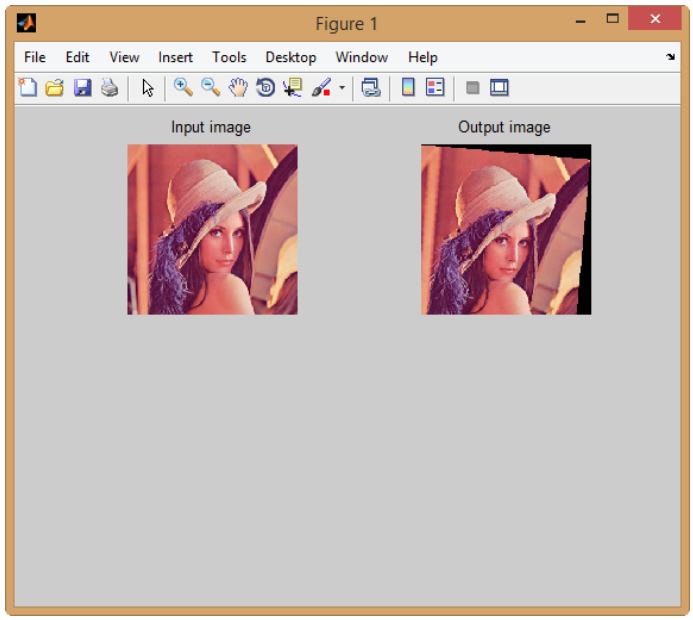

Figure 3: The result of rotating the coordinates of original pixel with angle (θ) of 5.

4) Shearing operations

4.1 In order to shear image, write a user-defined function in MATLAB for tilting the coordinate of original pixel. Take the following program name: Myshear.m. When this program is used with the image "lena_color_256.tif" result as shown in Figure 4.

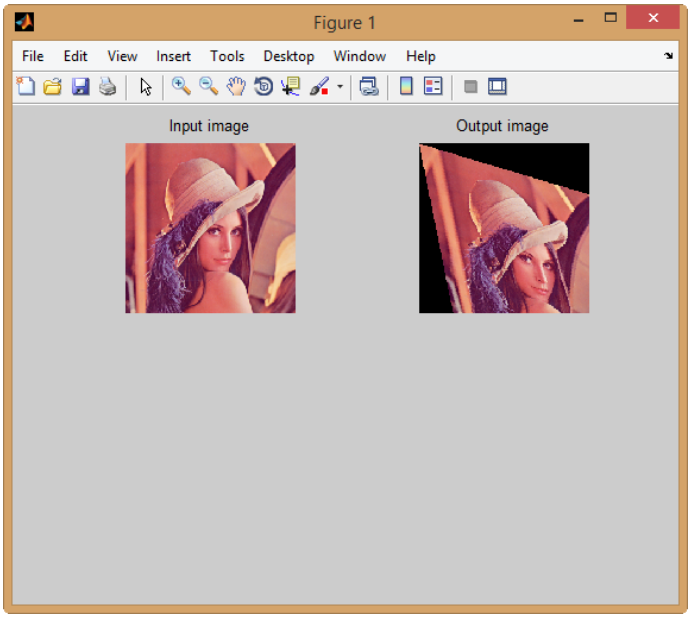

Figure 4: The result of tilting image in the x-coordinate with ratio (Sh_x) of 0.2 and the y-coordinate with ratio (Sh_y) of 0.3.

5) Combine two operations, including translation and scaling

5.1 In order to combine translation and scaling operations, write a user-defined function in MATLAB to translate and then scale the coordinate of original pixel within image. Take the following program name: Mycom2TranScal.m. Using this program on the image "lena_color_256.tif" should give you result as shown in Figure 5.

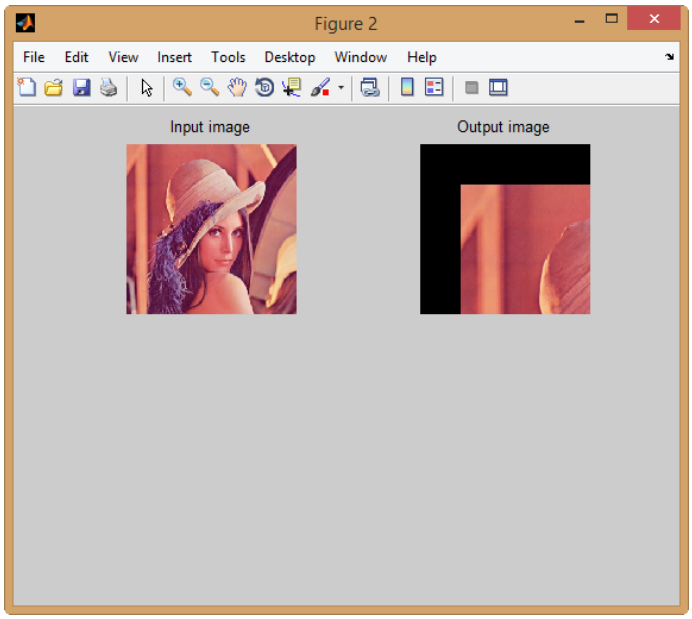

Figure 5: The result of translating and then scaling the coordinates of original pixel (with T_x of 20, T_y of 20, S_x of 2, and S_y of 2).

6) Combine two operations, including scaling and translation

6.1 In order to combine scaling and translation operations, write a user-defined function in MATLAB to scale and then translate the coordinate of original pixel within image. Take the following program name: Mycom2ScalTran.m. When this program is used with the image "lena_color_256.tif" result as shown in Figure 6.

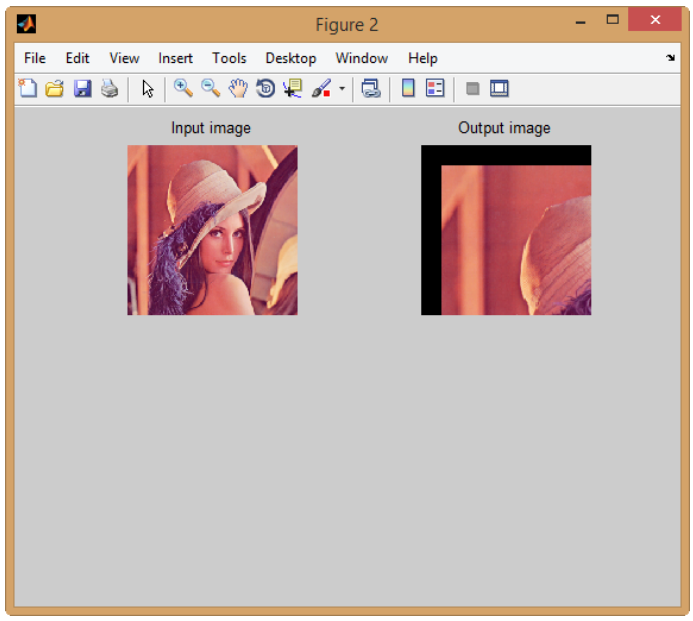

Figure 6: The result of scaling and then translating the coordinates of original pixel (with S_x of 2, S_y of 2, T_x of 20, and T_y of 20).